

**05-R-321, Center for Functional Nanomaterials,  
Brookhaven National Laboratory, Upton, New York**

(Changes from FY 2005 Congressional Budget Request are denoted with a vertical line in the left margin.)

### Significant Changes

While advancing Project Engineering Design and establishing project baseline, the Center for Functional Nanomaterials (CFN) Laboratory/Office building has been increased from approximately 85,000 gross square feet to 94,500 gross square feet, to optimize clean room space and building performance. There is no increase to the Total Project Cost (TPC).

### 1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost (\$000)	Total Project Cost (\$000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2005 Budget Request (Preliminary Estimate) .....	4Q 2003	4Q 2004	3Q 2005	2Q 2008	79,700	81,000
FY 2006 Budget Request (Performance Baseline).....	4Q 2003	4Q 2004	3Q 2005	3Q 2008	79,700	81,000

### 2. Financial Schedule

(Dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Project Engineering & Design (PED)			
2003	988 <sup>a</sup>	988 <sup>a</sup>	733
2004	2,982 <sup>a</sup>	2,982 <sup>a</sup>	2,721
2005	1,996 <sup>ab</sup>	1,996 <sup>b</sup>	2,152
2006	0	0	360
Construction			
2005	18,317 <sup>ab</sup>	18,317 <sup>ab</sup>	13,801
2006	36,553 <sup>a</sup>	36,553 <sup>a</sup>	34,983
2007	18,864 <sup>b</sup>	18,864 <sup>b</sup>	23,371
2008	0	0	1,579

<sup>a</sup> PED funding was reduced by \$12,000 as a result of the FY 2003 general reduction and rescission, and by \$18,000 as a result of the FY 2004 rescission. This total reduction is restored in FY 2005 and FY 2006 to maintain the TEC and project scope.

<sup>b</sup> PED funding was reduced by \$16,000 and construction funding by \$148,000 as a result of the FY 2005 rescission. This reduction is restored in FY 2007 to maintain the project scope and TEC.

### 3. Project Description, Justification and Scope

This project will establish a Nanoscale Science Research Center (NSRC) at BNL. The scientific theme of the BNL Center for Functional Nanomaterials (CFN) is “atomic tailoring of functional nanomaterials to achieve a specific response.” The CFN will be a user facility designed to provide a wide range of tools for the preparation and characterization of nanomaterials. The CFN will seek to integrate these unique capabilities with other BNL facilities, including the broad range of synchrotron characterization techniques available at the National Synchrotron Light Source (NSLS).

The CFN will be a new building, located across the street from the existing NSLS. Siting of the CFN will take advantage of close proximity to the Instrumentation Division and the Departments of Physics, Materials Science, and NSLS, which are key interdisciplinary participants in nanoscience research.

The design and scope of the CFN will fulfill DOE mission needs and incorporate input from potential users, gained through many channels including outreach efforts such as workshops. An essential component of the project is to establish an organizational infrastructure open to external users based on peer review. In this way a truly national nanomaterials effort can create breakthrough opportunities. The laboratory areas are organized into seven facility themes established to provide the necessary primary user service. Facility theme functions cover a wide range of physical and chemical synthesis and characterization. They are designated Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, Theory and Computing, and CFN Endstations at NSLS. The CFN will allow users to control processes, tailoring the properties of materials structured on the nanoscale. Some of these materials, all relevant to the BES mission, include piezoelectrics, ferroelectrics, organic films and conductors, magnetic nanocomposites, and catalysts.

This effort began with preliminary engineering (Title I) and detailed engineering design (Title II) necessary to construct a BNL Center for Functional Nanomaterials. The engineering effort includes all engineering phase activities, including field investigation, preliminary design, specifications and drawings for conventional construction, final design, preparation of procurement documents for experimental equipment, and construction/equipment procurement estimates.

The completed design will enable construction of a new two-story Laboratory/Office building of approximately 94,500 gross square feet. The facility will include clean rooms, general laboratories, and wet and dry laboratories for sample preparation, fabrication, and analysis. Included will be some of the equipment necessary to explore, manipulate and fabricate nanoscale materials and structures. Also included are individual offices and landscape office areas, seminar area, transient user space for visiting collaborators with access to computer terminals, conference areas on both floors, and vending/lounge areas. In addition it will include circulation/ancillary space, including mechanical equipment areas, corridors, and other support spaces.

Technical procurement for the project will include an initial suite of laboratory equipment for the CFN laboratory themes: Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, and Theory and Computing as well as for the CFN Endstations at NSLS.

The FY 2005 funds for the CFN will be used to complete project engineering and design, and begin conventional construction and technical equipment procurement. FY 2006 funds will be used to continue conventional construction and technical equipment procurement.

The building will incorporate human factors into its design to encourage peer interactions and collaborative interchange by BNL staff and CFN users and visitors. In addition to flexible office and laboratory space it will provide “interaction areas” including a seminar room and a lunch room for informal discussions. This design approach is considered state-of-the-art in research facility design as it leverages opportunities for the free and open exchange of ideas essential to creative research processes.

#### 4. Details of Cost Estimate

(dollars in thousands)		
	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications at \$2,708K).....	3,283	3,105
Project Management costs (2.4% of TEC) .....	1,921	1,820
Design Management Costs (0.5% of TEC) .....	361	415
Total, Design Costs (7.0% of TEC).....	5,565	5,340
Construction Phase		
Technical Facilities		
Equipment.....	25,821	29,480
Inspection, design & project liaison, testing, checkout and acceptance .....	218	330
Project Management (0.1% of TEC) .....	58	135
Total, Technical Costs .....	26,097	29,945
Conventional Facilities		
Improvements to Land.....	865	945
Building Construction .....	28,457	23,465
Site Utilities .....	4,527	4,420
Standard Equipment .....	903	920
Inspection, design & project liaison, testing, checkout and acceptance .....	542	875
Project Management (1.9% of TEC) .....	1,477	1,725
Total, Construction Costs .....	36,771	32,350
Contingencies		
Design Phase (0.5% of TEC).....	401	642
Construction Phase (13.6% of TEC) .....	10,866	11,423
Total Contingencies.....	11,267	12,065
Total, Line Item Costs (TEC) .....	79,700	79,700

#### 5. Method of Performance

Design and inspection of the facilities and equipment will be by the operating contractor and A/E subcontractor as appropriate. Technical construction will be competitively bid, lump sum contracts. To

the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

## 6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 2004	FY 2005	FY 2006	Outyears	Total
Project Cost						
Facility Cost						
Design.....	733	2,721	2,152	360	0	5,966
Construction .....	0	0	13,801	34,983	24,950	73,734
Total, Line Item TEC.....	733	2,721	15,953	35,343	24,950	79,700
Other Project Costs						
Conceptual design cost <sup>a</sup> .....	280	0	0	0	0	280
NEPA Documentation Costs .....	10	0	0	0	0	10
Other project-related costs.....	10	0	0	0	1,000	1,010
Total, Other Project Costs.....	300	0	0	0	1,000	1,300
Total, Project Cost (TPC) .....	1,033	2,721	15,953	35,343	25,950	81,000

## 7. Related Annual Funding Requirements

(FY 2009 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs .....	18,500	18,500
Total annual operating funding.....	18,500	18,500

<sup>a</sup> Experimental research will begin at the time of beneficial occupancy of the facility. These research costs are not part of the TPC and are funded by BES.